Attachment B

Declaration of David J. Malfara and William E. Steenson

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
International Comparison and Consumer Survey Requirements in the Broadband Data Improvement	)	**GN Docket No. 09-47**
	)	
A National Broadband Plan for Our Future	)	**GN Docket No. 09-51**
	)	
Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 Of the Telecommunications Act of 1996, as Amended By the Broadband Data Improvement Act	)	**GN Docket No. 09-137**
	)	
Petitions for Rulemaking and Clarification Regarding The Commission's Rules Applicable to Retirement of Copper Loops and Subloops	)	**RM-11358**

Declaration of
David J. Malfara and William E. Steenson

We, David J. Malfara and William E. Steenson, declare that the following is true and correct, to the best of our knowledge, information and belief:

Introduction and Qualifications

1. We are principals in the ETC Group, LLC, a business management and engineering consulting company. Our business address is 312 Tamarak Trail, Greensburg, Pennsylvania 15601. The ETC Group specializes in advising telecommunications service providers on the management, operation and deployment of emerging technologies.

2. Mr. Malfara is President/CEO of ETC Group, LLC, and is responsible for the modeling, planning and design of next-generation technologies and networks for the company's carrier, municipal and enterprise clients. Prior to founding ETC Group, LLC Mr. Malfara served as President/CEO of Remi Communications Holdings, LLC and its subsidiaries, where he also served as Chief Technology Officer.

3. For more than 30 years Mr. Malfara has been an active participant in the continuing evolution of the Telecommunications Industry. Mr. Malfara is a former member of the Management Committee of the Pew Consulting Group, a Philadelphia-based consulting firm. Mr. Malfara has previously served as President of Z-Tel Network Services, Inc, which became the largest consumer-based CLEC in the U.S. with annualized revenue of nearly $300 Million and more than 340,000 subscribers. Mr. Malfara has also held engineering and management positions at National Computer Corporation, Honeywell Information Systems, and GTE Telenet, where he designed and developed large-scale packet switched global networks for Fortune 50 companies. In 1983, Mr. Malfara formed Pennsylvania Alternative Communications, Inc., a nationwide long distance telephone company later sold to LCI International (Qwest). In 1995, Mr. Malfara co-founded Pace Network Services, providing traffic and signaling services to telecommunication carriers. Pace became the largest supplier of SS7 connectivity to the interexchange carrier community with more than 100 carrier-customers prior to its sale to ICG Telecom Group, Inc. in 1996.

4. Mr. Malfara also served for more than 10 years as a Director of COMPTEL and chaired the association's Technology Task Force. Mr. Malfara is a member of the Institute of Electrical and Electronics Engineers.

5. Mr. Steenson provides engineering consulting services regarding legacy and next generation networks to the ETC Group and its clients, with a particular emphasis on Class 4/5 carrier services. Prior to ETC Group, LLC, Mr. Steenson was Director of Network Operations for Remi Communications, planning and managing the carrier's VoIP operations and next generation portfolio of commercial services.

6. Mr. Steenson has more than 40 years of experience in broad areas of computer and telecommunications technology. Prior to joining Remi Communications, Mr. Steenson was employed for 37 years by Bell of Pennsylvania, AT&T Computer Systems, Bell Atlantic and, finally, Verizon Communications. Mr. Steenson began his career in Outside Plant Construction and Special Services, supporting data communications services for enterprise customers. Mr. Steenson has held a variety of technical positions, including positions that provided support for advanced data services and central office switching systems.

7. Mr. Steenson also created critical data performance monitoring systems for Verizon's Network Control Center operations that audited more than 70 switching centers and provided consolidated electronic loop data for more than 500 switching centers and 8,000 remote systems to ensure such systems achieved corporate performance and service objectives. Mr. Steenson holds more than 30 certifications in various telecommunications and information technologies.

8. The purpose of our declaration is to describe the copper plant architecture, outline common costs associated with making the facilities available for services, and explain the most common practices used by incumbent local exchange carriers as fiber optic cables are deployed in outside plant. Because new technologies are able to transform copper loops to support broadband speeds, the existing copper network is a vast underutilized

resource that can be used to promote the nation's drive to advanced services. As such, it is important to understand how easily copper facilities can be returned to service for a competitive entrant seeking to offer broadband service.

Loop Distribution -- Overview

9. Understanding how incumbent local exchange carriers replace copper facilities first requires an understanding of the basic topology of local distribution networks. Local loop distribution plans in the telephone local exchange have evolved significantly since the early 20th century. Distribution initially involved "party lines," where multiple "bridge taps" to a single untwisted pair wire (drop) provided exchange access to multiple customers which over time, has evolved to a distribution method with a dedicated "home run" of contiguous copper pair from the central office to each point of customer interconnection.

10. The Serving Area Concepts (SAC) Plan originated with the pre-Divestiture (1984) Bell System and continued as the dominant model for new plant construction, cable relief projects and replacements of end-of-life or deteriorated distribution facilities. As the name implies, the widely-used SAC Distribution Plan is a concept to generally organize local loop distribution efforts, but does not require strict adherence to an absolute Outside Plant (OSP) standard practice. Rather, it is intended to be adaptable to the unique distribution requirements of each Wire Center Area (WCA) environment (urban, suburban, rural or hybrid), topography and potential growth in subscriber densities.[1]

11. WCAs are further divided into Customer Serving Areas (CSAs) as a result of due consideration given to a number of factors. These factors include existing subscriber counts and projections of future subscriber concentrations and densities based upon known plans for commercial/industrial and housing development.

12. Local exchange distribution plant are commonly divided between F1 and F2 facilities. The first components of the SAC-based local exchange distribution system are designated F1 facilities and consist of feeder pairs contained within a sheathed cable extending from the WC Main Distribution Frame (MDF) to an outside structure called a Service Area Interface.[2] These F1 cable pairs terminate within the SAI to a mass termination point that serves as the single point of access to the F1 feeder pairs.

13. In most urban, and many suburban deployments, WCA F1 cables will be housed in underground plant and the only appearance above ground will be at the SAI. However, F1 cable routes can comprise a combination of plant facilities: underground,

1 In the discussion that follows, the term *Wire Center* (WC) is defined as the point of origin of the local exchange distribution network and is usually located within the Central Office building of the incumbent local exchange carrier. The term *Wire Center Area* is used to define the geographical footprint of all the local loops terminating in a Wire Center.

2 Terms used to describe the Service Area Interface include: B-box, cross-connect box, cross box, or access point.

aerial (poles) and/or direct earth buried deployments. As mentioned above, regardless of the construction method, the SAI will be the first and only access to the F1 feeder pairs.

14. Distribution cables – designated F2 facilities – originate at the SAI and are further extended throughout the CSA. F2 cables are deployed using available plant facilities, underground conduit, aerial (poles) and/or direct earth buried. Generally, F2 facilities for new construction/development are buried. However, practices and methods implementing Service Area Concepts to existing plant in established neighborhoods/areas would include reuse of the existing cable facilities, which are commonly aerial.[3] The far end of F2 facilities terminate in aerial cable terminals, buried pedestals or building terminals, in anticipation of final extension to the customer premise via a "drop wire".

15. The WC MDF is the point of origin for local distribution cables. These feeder cables are large, especially in metropolitan areas, commonly housing between 900 to 2,700 copper pairs. These cables exit the WC as a single sheath. Once a feeder cable is extended into a CSA, however, groups of pair counts (typically 100 pair or multiples of 100) originate within the feeder cable may be assigned to an interconnected lateral cable run. (The remaining cable pairs remain in the feeder cable and continue away from the WC for assignment to additional lateral cable runs or SAIs.) In certain deployments, demand may require that multiple F1-designated cables are extended from the WC to a given SAI.[4]

16. Over-time, the home-run copper arrangement described above has evolved to include the deployment of Subscriber Loop Carrier (SLC) systems, including Digital Loop Carrier (DLC) systems. SLC systems were developed: (1) to reduce copper cable-pair requirements on long F1 cable runs from the WC to the SAI and, (2) to overcome electrical constraints that would otherwise impede performance on long loops of copper wire. DLC is sometimes used to minimize copper investment used to support additional F1 loops.[5]

---

[3] Underground F2 facilities would be the less common but may exist, for example, in industrial/commercial park settings.

[4] By way of example, consider the following assignment structure for a hypothetical "Cable 8" (represented as CA 8, 1-1800), which is an eighteen-hundred pair cable serving 2 specific neighborhoods within the CSA, and an industrial park (RIDC Park) with 'home-run' facilities. The cable count (pairs) assignments could be as follows:

CA 8, 1-600: F1 pairs for SAI 1901 N Main Street – F2 aerial plant
CA 8, 601-1200: F1 pairs for SAI 4901 Route 28 – F2 aerial & buried plant
CA 8, 1201-1400: terminate Building 1, Allegheny RIDC Park – Home-run facility
CA 8, 1401-1600: terminate Building 2, Allegheny RIDC Park – Home-run facility
CA 8, 1601-1800: terminate Building 3, Allegheny RIDC Park – Home-run facility

[5] For example, Subscriber Line Carrier (SLC-5) in a "Mode 1" configuration uses eight pairs of copper facilities extended from the WC to support four T1 circuits which, in turn, render an electronic equivalent of 96 F1 pairs. A "Mode 2" configuration (which employs 2 to 1 concentration) uses only four pairs of copper facilities extended from the WC to support two T1 circuits which, in turn, render an electronic equivalent of 96 F1 pairs. From a SAC perspective,

17. The Serving Area Interface (SAI) is the point at which F1 facilities are terminated and cross-connected to F2 cable-pairs. The SAI is commonly an above-ground weatherproof telephone cabinet, anchored to a cement slab. The SAI contains mass termination blocks for the purpose of terminating and cross-connecting F1 and F2 cable pairs. The cables enter from underneath and terminate pursuant to OSP engineering documents.

18. Within an SAI, the F1 to F2 connections are designated by an assignment document, and are completed by connecting the feeder pair (F1) to the isolated pair (F2) with 'jumper' wire. By definition F2 facilities are referenced as *isolated cable* because they are not connected to – and therefore, isolated from – the WC until an SAI jumper is installed from the F1 feeder pair to the distribution F2 pair.[6]

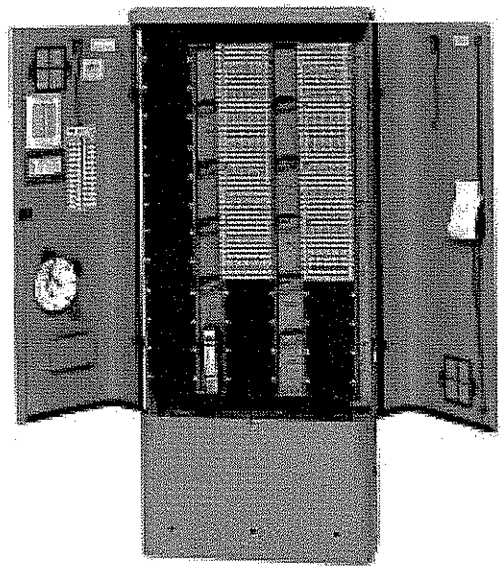

Figure 1. SAI (Cross-Connect Cabinet)

19. The F2 pair-counts are distributed throughout the CSA. F2 loops are accessed from pedestals (buried plant), cable terminals (aerial plant) or building terminals. Loop connection to the premise – whether achieved using buried or aerial deployment – is completed by placing or extending an appropriate Service Access Wire (more commonly called a drop wire) from the interconnected F2 facilities to the premise Network Interface Device (NID).

20. The SAC Plan described above may not be well suited for all wire centers. WCs that are geographically small, serve center city commercial districts comprised of high-rise office buildings or a WC local distribution that is predominately in underground facilities (system of manholes connected by multi-duct conduit), may present unique challenges and cost to adopting the SAC Plan. Additionally, established service areas located within a tight radius of the WC (perhaps a few thousand feet) with limited growth potential and sufficient vacant facilities may not be included in SAC distribution.

---

there is no difference between physical copper or electronically derived feed pairs, notwithstanding certain non-POTS service restrictions for electronically rendered pairs. DLC cable designations follow the generally accepted name convention for Pair Gain system such as PG-CA 3, or perhaps PG 3 followed by the pair count as in PG 3, 1-400.

6 An example of a F1-to-F2 assignment follows:

F1: 8, 307
F2: SAI 1901 N Main, 251
TEA: Bldg 231 First, BP 51; NID 3, POS 4

In the example above, the SAI jumper will connect F1 pair 8, 307 and F2 pair1901 N Main, 251. The last assignment line is the terminating address (TEA) of the F2 pair far end.

21. In these cases, local distribution will rely on facilities that connect directly to the MDF using 'home run' facilities rather than the feeder/isolated distribution model described above.[7] In such instances, the local cable is distributed by assigning cable counts (pairs) to streets and/or buildings.

Standard Maintenance Requirements for Copper Loop Facilities

22. The discussion above provided a simplified overview of the facilities used to connect end-user premises to central offices. This collection of these facilities is commonly referred to as the *local loop – i.e*, in reference to the complete communications path from the MDF to the subscriber premise NID. This path includes a cable pair or pairs (F1, F2), cross connections, including the connection from a building terminal to a NID and, in the case of buried or aerial plant, a Service Access Wire (Drop) to the premise NID.

23. The standard maintenance requirements for outside plant is largely determined by the type of construction method used to deploy the plant, in particular whether such facilities are underground, buried or aerial. As we explain below, most activities considered "maintenance" activities are typically associated with a specific event, not a routine or periodic practice.[8]

24. Underground Cable is cable housed within a reinforced closed space (such as conduit), that is itself buried.[9] This protected environment is immune to common maintenance concerns. The loss of cable air pressure, resulting in a Gas Pressure Alarm, would be a common fault indicator that would initiate a "maintenance activity." Loss of pressure would allow any environmental water to enter the cable and cause immediate damage to pulp insulated conductors; damage to cable using plastic insulated conductors would occur gradually, over time.

25. Buried Cable (cable that is directly earth-buried without conduit) is also protected from most natural events, such as inclement weather that may damage aerial cable. The most common physical damage affecting buried facilities is cause by errant digging – excavation (the well-known "backhoe effect"). Buried plant terminals (pedestals) are, additionally, exposed to surface mishaps – accidents and some malicious damage, although rare.

---

7 It is reasonable to expect a center-city commercial area to have underground facilities, while established neighborhoods in close proximity to the serving WC will have aerial plant.

8 In this sense, the term maintenance for outside plant differs from how the term in used in everyday parlance. For instance, most people would distinguish between a routine activity necessary to the upkeep of their car (changing the oil, for instance) from an event-specific expense such as fixing the fender after an accident. In the area of outside plant "maintenance," however, the activities covered by the term are more like "fixing the fender" in response to an event, than a collection of routine preventive acts intended to maximize the expected useful life of the facility.

9 Buried cable is a separate category of outside plant and is discussed separately in this section.

26. Aerial Cable is most susceptible to physical damage, including damage from:

- Weather (storms, high winds and lightning)
- Over-height vehicle impact damage
- Motor vehicle damage to poles which compromises cable support and subsequently damages cables
- Tree removals
- Fire

27. Service Access Wire (Drop) can be buried or aerial and naturally shares the same hazards as the distribution plant (aerial or buried). Additional exposure to mishaps would be classified as subscriber events, construction (roofing, siding or additions) and landscaping activity, that either sever the drop or disturbs the first attachment (down or sagging aerial drop).

28. Hazards that are common to all outside plant include: (a) facility relocations for road improvements and construction, and (b) locate requests (in particular, requests to locate underground and buried plant).

Returning Idled-Copper to Service

29. As indicated earlier, maintenance activities for copper outside plant facilities are *event* driven. There are no routine maintenance procedures in effect for copper cables. Consequently, there are no plant-specific maintenance activities to keep idle-facilities in a condition to return to service (other than any repair associated with the events described above). These activities generally can either be conducted when the event occurs, or upon request to bring the loop back in-service.

30. Subscriber trouble reports comprise the predominant triggering events for local loop maintenance or, more accurately, local loop repair activities. These ad hoc service complaints represent service interruptions on a specific local loop and the repair processes are straightforward. The most common local loop faults fall within the following categories and are not costly to repair with respect to either technician-hours or material.

> Physical connections – corrosive degradation, improper termination or terminations disturbed by unrelated activity. The repair is comprised of cleaning the terminal connection and/or re-terminating or replacing a jumper wire.
> Defective Drop – Aerial drops are replaced; buried drops are repaired if the defect can be exposed (dug up ends) otherwise, replacement is necessary.
> NID and Protection Grounding – repair or replace
> Customer Equipment and Wiring – While not part of the local loop, customer equipment and wiring are the cause of many technician premise visits.

31. *Single* local loop faults within the physical cable sheath or in a splice closure are, as a practical matter, rarely repaired in buried or underground cable deployments. These trouble reports are resolved by simply changing the assigned cable pair and marking the defective pair as such in the cable records. Single pair repairs are undertaken more often in aerial cables where there may be few or no vacant pairs in the affected cable count.

32. The root cause of *multiple* service outages and expensive copper repair is that of physical damage to the copper core of a cable and, unfortunately, is a risk to all plant construction – aerial, buried and underground. Excavation and drilling are the primary causes of damage to buried and underground cables, whereas severe weather, vehicle accidents and fire are the leading cause of aerial plant damage. An outline of the various repair activities for each type of deployment follows:

> <u>Underground</u> – Underground plant is the type of deployment most protected from physical damage and facility damage is rare; however, such repair is labor and material intense. Cable core damage, by definition includes damage to the ductwork. Therefore, repair activities include duct repair/replacement, placement of a new section of cable between the adjacent manholes and new splices completed in each manhole. Individual conductors, of non-color coded cable, will require identification (testing) from the MDF and the far-end termination(s). Pair identification is extremely labor intensive and, for large cables, completion of this activity could take days.
>
> <u>Buried</u> – Core damage repair at an excavation or drilling site is routine for commonly occurring circumstances. Assuming the damage is apparent the repair process is simple; expand the trench to expose undamaged cable, place a new length of cable and splice both ends of the new cable. Filling the splice closure with an appropriate encapsulate and back filling the trench completes the repair. Pair identification for buried cables is not burdensome – all buried cables in-place since the 1970s are color-coded, providing easy identification.
>
> <u>Aerial</u> – Repair strategies for aerial deployments do not differ from underground or buried facilities in that placing a new section of cable to replace the damage is the standard. However, sheath repairing, where there is no core damage is an option for small defects. A pair identification requirement, noted for underground plant, may be applicable to some older aerial cables.

33. As a practical matter, the preceding discussion of placing retired loops back in service presupposes that retirement of the loop in question did not include physical removal or abandonment in place of the underlying copper distribution cable (F1 or F2) facilities in totality or on a piecemeal basis. Abandonment in place is the physical isolation of copper facilities from the distribution network with no anticipation of copper recovery. As discussed below removal or abandonment of the copper is unnecessary for fiber deployment.

<u>Common Fiber Deployment Practices and the Impact to the Copper Facilities</u>

34. We now turn our discussion to current common practices in the deployment of fiber facilities and the impact on the copper plant. At the distribution level, whether destined to function as a SAC F2 or a home run facility, the common practice is to deploy optical fiber using the construction technique used to deploy the original *copper p*lant. That is, where there is buried copper, incumbents will likely deploy buried fiber and where there is aerial copper, incumbents will likely deploy aerial fiber.

35. In the case of buried construction technique, whether new fiber is installed in close proximity to the supplanted buried copper or across the street, historical practice would indicate that it is unlikely the ILEC will attempt to recover buried copper. As such, the reactivation of buried copper presents no unique issue because, in our experience, the copper facility remains in-place

36. In the case of aerial construction technique, in numerous areas of the county it is common practice that instead of constructing new aerial cable runs, or adding a new cable run on existing poles, fiber facilities are installed using a technique referred to as "double lashing." Double lashing is a technique used to secure multiple cables to one strand. The following is a short explanation of the "double lashing" technique (see Figure 2).

37. Placing aerial cable is a two-step process. First a support cable is place and tensioned. This support cable has many names; strand, messenger, cable support and others; however, to avoid confusion "strand" shall be used to define the stranded steel cable that supports aerial communications cables. The communications cable (copper or fiber) is then secured to the strand by lashing. The lasher spiral wraps the cable to the strand with lashing wire.

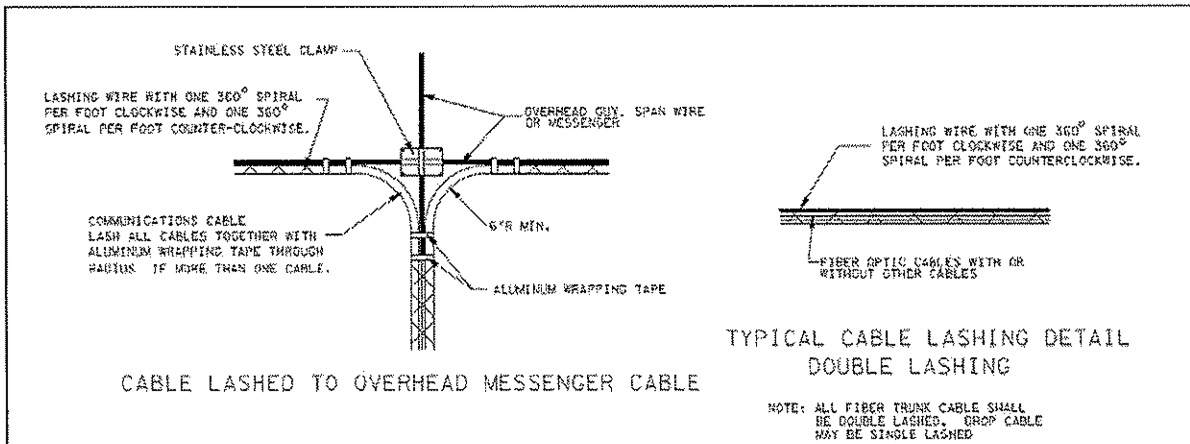

Figure 2: Lashing

38. In the above example, a fiber cable is double lashed to an existing copper cable. The effect of double lashing is that the copper cable remains indefinitely as a critical part of the infrastructure since its subsequent removal would be costly and problematic;

possibly resulting in service outages to customers served using the newly-placed fiber facility.

39. It is generally not necessary nor, as described above, common for the ILEC to remove copper upon the deployment of fiber. The ILEC would incur costs to do so. In fact, the labor and construction costs of copper cable removal would, very likely, meet or exceed the original cost of deployment, rendering any salvage value of the actual copper cable moot. This point is supported by the fact that ILECs, historically, have not removed unused copper cable when alternative routing or facility re-arrangement has rendered the cable unnecessary (i.e. "abandon in place") unless lack of available ductwork or pole clearances have required them to do so.

40. As part of provisioning FTTH to the subscriber's premise, however, the existing drop (SAW), NID and grounding may be removed, with a buried SAW likely to be cut at ground level and an aerial SAW totally removed. Removal of these drops may be part of telephone company policy; however, such removal is not technically necessary and may result in the removal of any opportunity for the customer to have access to competitive alternatives to the incumbent service provider.

<u>The Incumbent Practice to Disconnect-in-Place</u>

41. The disconnect-in-place (DIP) strategy was implemented to reduce 'truck rolls' for re-connecting switched services. Simply put, a disconnect-in-place service order leaves connected and in place all necessary network facilities (this could include but is not limited to cable assignments, local loop cross connections, service access wire, drop/entrance facilities, and NID) to preserve electrical continuity to the customer premise (demarcation point in a building) and retain its association to a service address. In some circumstances DIP has not been used, however, the copper may still remain otherwise in place and available for service. In some jurisdictions, the MDF cross connection between the cable pair and the switch port, commonly referenced as OE, also remains in-place. One reason for this varied use of DIP was due to increased demand for the copper loop facilities in areas where, insufficient F1 or F2 facilities existed. In such instances, the DIP would be broken and the required F1 or F2 facility would be re-assigned to support the requested loop. In the case of copper retirement, however, copper exhaust is not an issue. Moreover, in modern distribution systems featuring fiber overbuilds of existing copper plant, no such danger exists so the DIP strategy is a viable practice for all copper plant in instances where incumbent LECs install fiber to supplant copper facilities.

42. Intermediate cross-connections (SAI and others) would be expected to remain undisturbed under the DIP model, as the removal of intermediate cross-connections would require dispatching a technician.

43. Because the provisioning of FTTH requires a premise visit, it is reasonable to conclude that that the copper drop and NID is at highest risk for disconnection or removal at that time (e.g., severing a buried drop near the premise at ground level; thereby, effectively abandoning the wire). This action can be the result of ILEC company policy,

technician initiated practice or through the request of a subscriber who does not understand the anti-competitive consequences of such an action. However, it is important to note that there are no technical reasons requiring routine removal or disconnection of network components such as cables, cross-connections, drops or NIDs.

44. Again, there are no technical reasons requiring the routine removal or disconnection of network components (cables, cross-connections, drops or NIDs). Occasionally, however, unusual circumstances may arise that could necessitate removal or abandonment of cables. Examples of these include: highway constructions/demolitions; clearing ducts in underground conduits or maintaining clearances on joint use poles. On rare occasions when the physical removal of any segment of the copper plant is necessary in order to deploy fiber cable, an EVPL (Ethernet Virtual Private Line) which supports the bandwidth characteristics of copper loops (single and bonded) and meets the specifications for such Ethernet Services Definitions as described by the Metropolitan Ethernet Forum[10] would prove to be an acceptable engineering alternative to copper loop(s) for most purposes.

This concludes our declaration.

David J. Malfara
President
ETC Group, LLC

William E. Steenson
Principal
ETC Group, LLC

[10] The MEF Technical Specification for Ethernet Service Definitions can be found at: http://metroethernetforum.org/PDF_Documents/MEF6-1.pdf . The Metro Ethernet Forum (MEF) is a global industry alliance comprising more than 145 organizations including telecommunications service providers, cable operators, MSOs, network equipment, test vendors, labs and software manufacturers, semiconductors vendors and testing organizations. The MEF develops technical specifications and implementation agreements to promote interoperability and deployment of Carrier Ethernet worldwide. All RBOCs are members of the MEF.